

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
20 January 2005 (20.01.2005)

PCT

(10) International Publication Number
WO 2005/005684 A1

(51) International Patent Classification?: C23C 14/35,
H01J 37/34

(72) Inventor; and

(75) Inventor/Applicant (for US only): KOUZNETSOV,
Vladimir [SE/SE]; Backlurav. 31 C, S-149 43 Nynäshamn
(SE).

(21) International Application Number:
PCT/SE2004/001129

(74) Agents: LINDEN, Stefan et al.; Bergensträhle & Lindvall
AB, Box 17704, S-118 93 Stockholm (SE).

(22) International Filing Date: 9 July 2004 (09.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0302045-0 10 July 2003 (10.07.2003) SE

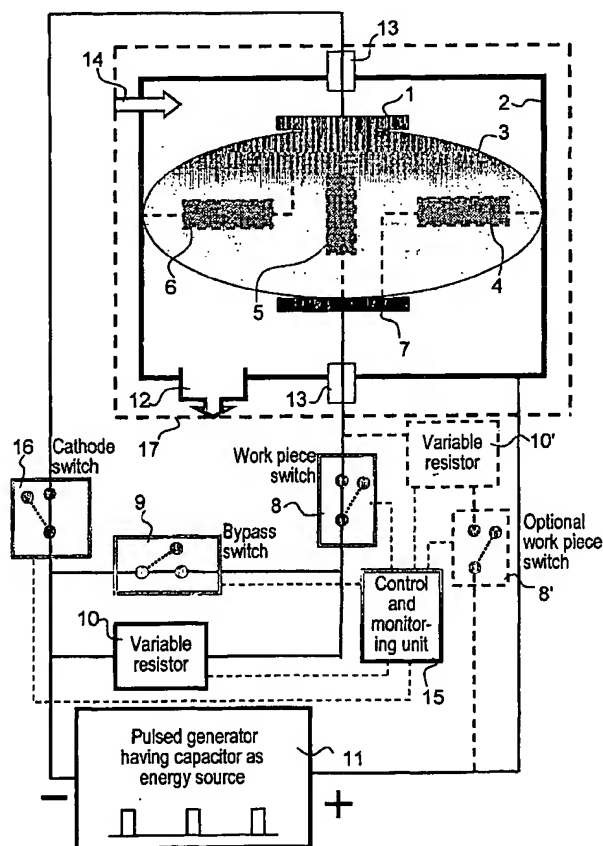
(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(71) Applicant (for all designated States except US): CHEM-
FILT R & D AB [SE/SE]; c/o Kungliga Tekniska
Högskolan, Alfvénlaboratoriet, Teknikringen 31, S-100 44
Stockholm (SE).

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: WORK PIECE PROCESSING BY PULSED ELECTRIC DISCHARGES IN SOLID-GAS PLASMA



(57) Abstract: Work piece processing is performed by pulsed discharges between an anode (2) and a magnetron sputtering cathode (1) in solid-gas plasma using a chamber (2) containing the work piece (7). A system (12) maintains a vacuum in the chamber and another system (14) provides sputtering and reactive gases. The pulses are produced in a plasma pulser circuit including the anode and the cathode, the discharges creating gas and partially ionized solid plasma blobs (3) moving or spreading from a region at a surface of the cathode towards the work piece and the anode. A potential is applied to the work piece so that a pulsed current comprising biasing pulses arises between the second electrodes. In particular biasing discharges are produced between the anode and the work piece when said plasma blobs have spread to regions at the anode and at the work piece so that the pulsed current is the current of these biasing discharges. The method is efficient for processing or modifying surface regions of work pieces of various kinds and configurations and can be employed for achieving efficient work piece etching, interface mixing, surface and bulk diffusion, gas absorption and desorption, initial and further stages of thin film condensation, and for performing ion plating.



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.